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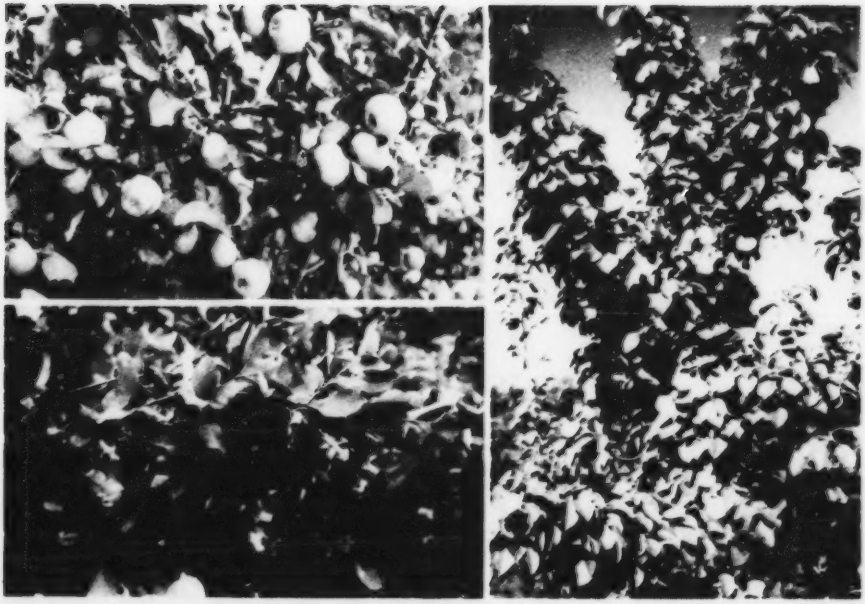
# Tree fruit production for the Prairie Provinces



Canada

# Tree fruit production for the Prairie Provinces

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Recommendations for pesticide use in this publication are intended as guidelines only. Any application of a pesticide must be in accordance with directions printed on the product label of that pesticide as prescribed under the *Pest Control Products Act*. **Always read the label.** A pesticide should also be recommended by provincial authorities. Because recommendations for use may vary from province to province, your provincial agricultural representative should be consulted for specific advice.

**Cover illustration**
Three excellent fruit crops for the prairies are apples (*top left*), saskatoons (*bottom left*), and pears (*right*)

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## Tips for production

- Choose the best site possible.
- Grow hardy cultivars recommended for your area.
- Take special care when planting the trees.
- Provide shelter and irrigation.
- Follow a suitable program of pruning, spraying, and cultivation.
- Protect young trees against mice and rabbits.

# Introduction

Growing fruit on the prairies has been a challenge ever since the prairies were first settled. Early explorers and settlers found a variety of native fruit, including high bush-cranberries, plums, saskatoons, and small-fruited cherries such as chokecherries and pin cherries. The lack of native apples, apricots, pears, and improved cherries and plums stimulated the first breeding work. Introductions of hardy plants, mostly from northeast Asia, provided the basis for many developments in hardy prairie tree fruits.

The orchards at prairie research stations, universities, and farms demonstrate that, with good management, fruit crops of high quality can be grown. Irrigation, shelterbelts, and other good management practices help to improve the growing conditions in the area. A key ingredient for success is the use of cultivars best adapted to the particular locality. The better adapted cultivars are listed in this publication.

# Factors influencing planting success

## Climate

The climate of the Prairie Provinces is generally semiarid with long, cold winters and short, warm summers.

The main limitations to growing tree fruits are scanty rainfall, extremes of temperature, strong winds, and a short frost-free period. In winter, sunshine often causes exposed tree trunks to sunscald and blister. The dehydration and subsequent freezing that ensues destroys plant tissue. Cracks in the bark formed by such damage increase the chances of invasion in summer by disease organisms that may weaken or kill the trees. Hail may damage plants and fruits during July and August. Severe hail causes bruises, scars, and blemishes that spoil the appearance and lower the quality of the fruits. Hail may also cause minor damage to young bark tissue.

The prairie climate has some advantages, too. Sunshine is more than adequate for ripening and coloring fruit. Diseases are not usually serious because the low humidity reduces the growth and spread of harmful fungi. Few insect pests can survive the cold winters.

### Rainfall

Lack of sufficient rainfall need not limit fruit production. When drought threatens, irrigation can save young trees and prevent damage to older ones. It is important to provide water when establishing the trees. Tap water is generally satisfactory. Many growers now have dugouts for impounding water for irrigation. Test well water for salinity to ensure that the quality is good enough for irrigation.

A total of 50 cm of water annually is needed to grow an apple crop. However, few areas of the prairies receive this much from rain and snow. Some parts of Manitoba do receive about 50 cm, but in most of the prairies the total is 40 cm or less. Fortunately, the rains usually come in May, June, and July and provide up to 25 cm of water when it is needed most. Fruit trees may grow and do moderately well without irrigation, but providing water increases the yields. Avoid irrigation after late August because the trees must have time to harden off new growth in preparation for winter.

### Temperature

Fruit trees can withstand high summer temperatures provided that they have sufficient water. However, low temperatures seriously limit their growth. Winterkill is usually caused by a combination of freezing, drying, and other factors, rather than by low temperatures alone. Late spring frosts, which occur in many years, often lower fruit yields by killing blossoms and buds. The safe period for vigorous growth of fruit crops is usually from May 24 to September 7 and averages about 100 days. Sharp frosts before the trees are hardened in fall may seriously injure the trunk and damage the tips of branches. Periods of mild temperatures in winter (during chinooks) may cause trees to become susceptible to winter damage during subsequent cold periods.

Southern Alberta has a special weather problem. In winter, chinook winds cause rapid rises in temperature. The alternate freezing and thawing cycles kill trees. In early spring, when the trees are no longer dormant, the chinooks cause buds to swell and begin new growth. Subsequent freezing temperatures may later kill them.

### Wind

Drying winds in all seasons make it impractical to attempt to grow fruit trees without providing shelter. Strong winds both in the heat and drought of summer and in winter increase evaporation and cause trees to dry out. High winds destroy branches and blossoms and, in the fall, can blow fruit from the trees.

## Plant hardiness

The Prairie Provinces have been divided into zones that relate plant hardiness to different climatic regions. The map of plant hardiness zones (Fig. 1) was originally prepared for ornamentals*; it is now widely used to identify harsher and more moderate growing regions for various crops.

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* *Ornamental shrubs for Canada*, Lawrence C. Sherk and Arthur R. Buckley. 1968. Agriculture Canada Publication 1286.

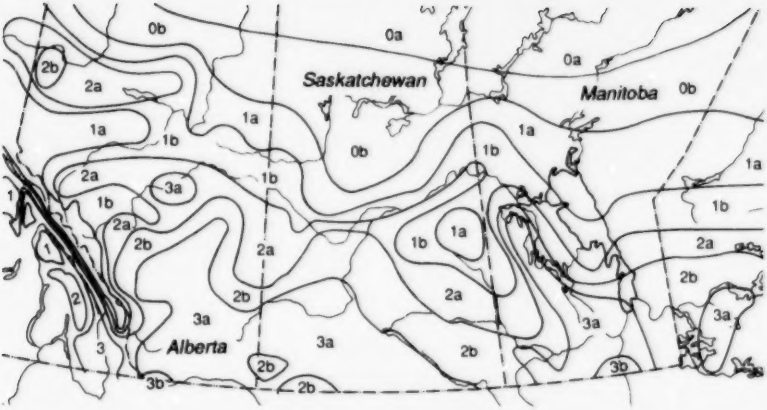



**Fig. 1 Plant hardiness zones in increasing order of suitability for growing tree fruits (redrawn after Sherk and Buckley 1968).**

Zone 0 is the coldest zone, whereas zone 3b is the warmest on the prairies. Areas with peculiar microclimates commonly exist within a zone and are colder or milder than the surrounding area. The zone lines are drawn arbitrarily, and the zones merge gradually into each other. Consequently, conditions near a zone border may closely approximate those of an adjacent zone. The natural conditions that delineate the zones may be modified by irrigation, shelterbelts, and urban development. Also, within each zone, soil conditions may have a wide effect on the suitability of the locality for fruit production. Detailed plant recommendations for each zone are not available, however, as a general rule, zone 3 is considered more favorable for fruit growing.

## Selecting cultivars

To be successful in growing tree fruits, choose plants with great care.

- Select cultivars that are hardy in your area; many cultivars developed on the prairies are adapted to the winters, but those popular in Ontario or British Columbia do not survive.
- Have a second cultivar for cross-pollination; most fruit trees will yield more if a similar cultivar cross-pollinates it, but ensure that their blossom periods overlap.
- Try to choose good-quality cultivars that yield well, but be prepared to sacrifice quality for hardiness where shelter and moisture are limited.

## Winter hardiness

The first requirement for a fruit tree in a prairie orchard is that it is able to withstand prolonged low temperatures. Plants that are winter hardy usually acclimate early enough in the late summer or fall to allow the plant to prepare for winter. It must remain dormant throughout the winter and not break bud until threats of spring frosts are low. Tender varieties, for example, may break their dormancy easily. Thus, in a winter with fluctuating temperatures the buds may lose their ability to withstand extreme cold and may be killed.

Cold can injure trees in several ways; it may partially damage and weaken them or may kill them completely. Frost can kill growing, succulent tissues, so in young trees the tips are likely to be killed when the new growth does not harden off before fall frosts.

During winter, tender trees may be killed to the snowline. When cold is abnormally severe and prolonged, splits in the trunks and root killing is common. Alternate freezing and thawing may kill roots as well. After a period of drought, trees with damaged roots are unthrifty and subject both to disease in the summer and to further injury the following winter. When trees are dormant, they continue to respire, and drying by extreme cold or a combination of cold and wind may severely damage or even kill them. Flower buds are more tender than leaf buds and may be killed or injured by low temperatures during the winter or early spring. This occurrence is common in apricots.

The use of hardy stembuilders and procedures to reduce sunscald are discussed in later sections of this publication.

## Pollination

For fruit to set, the trees must bloom and the flowers must be fertilized by pollen. Only a few cultivars are self-fertile, that is, capable of fertilizing the ovaries of their own flowers with their own pollen and thus forming fruit. Fruit trees generally do not set fruit well unless other pollinizing trees are provided. Some types are partially self-fertile and set a few fruits, but compatible pollinizers of the same fruit type are needed to get good yields.

To ensure adequate supplies of pollen, have at least two different fruit cultivars in blossom at the same time. Pollen from various apples, crab apples, and apple crabs can pollinate other cultivars of this group, but not other kinds of fruits such as plums and pears. Similarly, plums and cherry plums can pollinate one another. The blossoming dates for most commercial apples and crab apples overlap enough for cross-pollination to take place. Native plum selections, related hybrids, and most Japanese-type plums also bloom together. Late-blooming plum cultivars need late-flowering pollinizers and here some sand cherries are useful.

In districts where various cultivars are grown, pollen from neighboring trees may be suitable, but remember that pollination is done by insects, mostly bees. Cold weather, rain, and spring winds, common in the prairies, hinder long flights of insects and prevent them from visiting the flowers. Topworking, by grafting a few branches of bearing trees with scions of a pollinizer, ensures that the necessary pollen source is close at hand.

## Cultivars

The cultivars listed in Table 1 have performed well in prairie plantings and are generally available from commercial nurseries. For information about other cultivars, either check your provincial fruit recommendations or inquire at the Agriculture Canada research stations or the horticulture department of the local university.

### Crab apples, apple crabs, and apples

Many crab apples, apple crabs, and apples developed by plant breeders are now grown widely on the prairies (Figs. 2 and 3). Orchardists and enthusiastic growers of fruit trees have selected worthwhile seedlings and named them; however, many of these have regional recognition only.

Crab apples are generally less than 5 cm in diameter. They vary in flavor, taste, and use. Some are suitable for jelly, others for canning and freezing, and still others as dessert apples. Crossing crab apples and standard apples has produced useful hybrids called apple crabs. They are large crab apples that taste like apples.

#### *Crab apples*

*Dolgo* (Russian parentage) Fruit ripe in early September, about 3 cm, an attractive bright red; excellent for jelly. Tree useful as an ornamental, very hardy. Cultivar developed at the Experimental Station, Brookings, S. Dak. 1917; recommended for all zones.

#### *Apple crabs*

*Dawn* (Columbia × Melba) Fruit ripe in early August, about 4.5 cm, light crimson, good for eating and cooking. Cultivar developed at the University of Saskatchewan, Saskatoon, Sask., 1959; recommended for Saskatchewan.

*Kerr* (Dolgo × Haralson) Fruit ripe in late September, about 4.5 cm, attractive solid dark purple red, good for eating and as jelly, excellent for canning and juicing, good for keeping. Cultivar developed at the Morden Experimental Station, Man., 1952; highly recommended for all provinces.

Table 1 Suggested cultivars for the Prairie Provinces

| Fruit type | Cultivars suited to more favorable zones | Cultivars suited for less favorable zones |
|---|---|---|
| Crab apple | Dolgo | Dolgo |
| Apple crabs | | |
| Early | Rescue | Dawn, Rescue |
| Mid season | Shafer, Trail | Renown |
| Late | Kerr | Kerr |
| Apples | | |
| Early | Breakey, Harcourt, Heyer 12, Norland | Heyer 12, Norland, Patterson |
| Mid season | Battleford, Carroll, Goodland, Parkland | Battleford, Parkland, Westland |
| Late | Collet, Fall Red, Godfrey, Haralson, Luke, September Ruby | Fall Red, September Ruby, Unity |
| Plums | Grenville, Norther, Pembina, Prairie, Ptitsin, Red Glow, Tecumseh | Bounty, Dandy, Elite, Norther, Patterson's Pride, Prairie, Ptitsin |
| Cherry plums | Dura, Manor, Opata, Sapa, Sapalta | Dura, Manor, Opata, Sapa, Sapalta |
| Sand cherries and bush cherries | Mongolian cherry, Nanking cherry | Mongolian cherry, Nanking cherry |
| Apricots | Brookcot, Scout, Westcot | Brookcot, Scout, Westcot |
| Pears | Golden Spice, Ure | John, Pioneer 3, Tait Dropmore, Ure |
| Saskatoons | Honeywood, Pembina, Smoky, Thiessen | Honeywood, Pembina, Smoky, Thiessen |

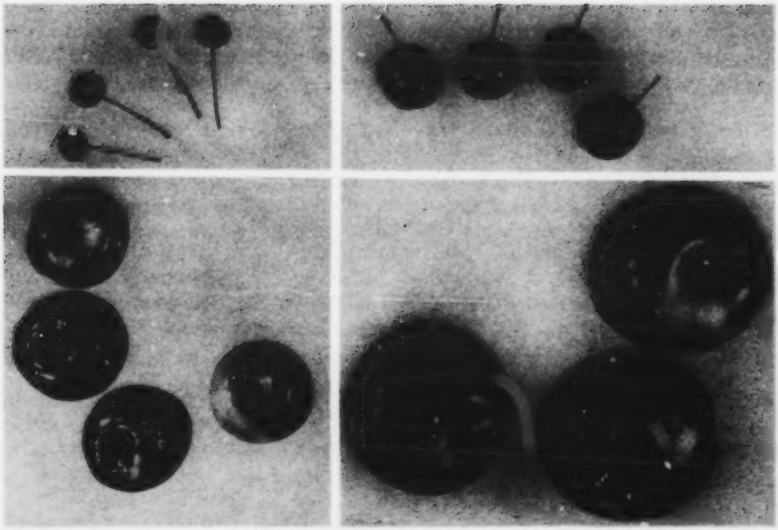


**Fig. 2** Cultivars that represent the improvement in size of hardy apples for the prairies. *Upper left*: *Malus baccata*, Siberian crab apple. *Upper right*: Dolgo, a crab apple, 1917. *Lower left*: Kerr, an apple crab, 1952. *Lower right*: Luka, an apple, 1961.

**Fig. 3** Excellent crops of large, good-quality apples can be grown in suitable areas of the prairies; this example is September Ruby.

*Renown* (Repka Kislaga seedling) Fruit ripe in early September, about 3.5 cm, yellow splashed with red, good for eating. Cultivar developed at the Experimental Farm, Indian Head, Sask., 1936; recommended for northern zones.

*Rescue* (Blushed Calville seedling) Fruit ripe in late August, about 3.5 cm, almost solid dull red over yellow, good for eating but goes mealy quickly. Cultivar developed at the Experimental Farm, Scott, Sask., 1936; recommended for all provinces.

*Shafer* (Rescue × Trail) Fruit ripe in early September, about 4.5 cm, yellow blushed with red; flesh yellow, tender and slightly coarse, sweet and pleasant for eating, good in quality. Cultivar discovered by W. Shafer, Poplar Point, Man., and introduced by the Morden Research Station, Man., 1963; recommended for Manitoba.

*Trail* (Northern Queen × Rideau) Fruit ripe in late August, about 3.7 cm, pale yellow, splashed and striped with orange red, good for eating. Cultivar developed at the Central Experimental Farm, Ottawa, Ont., 1913; recommended for favorable zones in all provinces.

*Apples*

*Battleford* (Russian apple seedling) Fruit ripe in mid September, 6–7.5 cm, striped and mottled red over pale yellow, fair for cooking. Cultivar discovered by W. Somerville, North Battleford, Sask., and introduced by Boughen Nursery, Valley River, Man., 1934; recommended for all provinces.

*Breakey* (Blushed Calville seedling) Fruit ripe in early September, 5–6.5 cm, striped bright red over yellowish green, excellent for eating, good for cooking. Cultivar developed at the Morden Experimental Station, Man., 1935; recommended for warmer regions of the prairies.

*Carroll* (Moscow Pear × Melba) Fruit ripe in early September, 6–7.5 cm, mottled and streaked bright red over creamy green, excellent for eating, good for sauce. Cultivar developed at the Morden Research Station, Man., 1961; recommended in favorable zones in all provinces.

*Collet* (parentage unknown) Fruit ripe in late September, 6–7.5 cm, medium red over creamy green, good for eating, excellent for cooking. Cultivar discovered by V. Collet, Notre Dame de Lourdes, Man., and introduced by the Morden Research Station, Man., 1961; recommended for favorable zones in all provinces.

*Fall Red* (Duchess × Haralson) Fruit ripe in mid September, 7–8 cm diameter, dull red with a yellow green background, good for fresh eating or storing, also acceptable for juicing; originated at the Morden Research Station, Man., selected at the University of Alberta, Edmonton, Alta., and introduced by the Prairie Co-operative Fruit Breeding Project, Morden, Man., 1986; hardy to zone 2a.

*Goodland* (Patten Greening seedling) Fruit ripe in mid September, 6–8 cm, washed red over creamy green, excellent for eating and cooking, good for storing. Cultivar developed at the Morden Experimental Station, Man., 1955; recommended for more protected sites and favorable zones.

*Haralson* (Malinda seedling) Fruit ripe in mid October, 6–7.5 cm, greenish yellow almost completely overlaid with red, fair for eating and cooking, excellent for storing. Cultivar developed at the Fruit Breeding Station, University of Minnesota, Minneapolis, Minn., 1922; requires a long growing season; recommended only for more favorable zones in all provinces.

*Harcourt* (parentage unknown) Fruit ripe in late August, 5 cm, blushed bright red, mild, with pleasant flavor. Cultivar developed at the University of Alberta, Edmonton, Alta., 1955; recommended for Alberta.

*Heyer 12* (Russian apple seedling) Fruit ripe in late August, 5–6 cm, straw-colored, good for pies and sauce but breaks down quickly after ripening. Tree suitable for dry areas, extremely hardy. Cultivar developed by A. Heyer, Neville, Sask.; recommended for all provinces.

*Luke* (parentage unknown) Fruit ripe in early October, 7.5–9 cm, mottled dark red over green, fair for eating, good for cooking and storing. Cultivar discovered by J. Luke, Rosthern, Sask., and introduced by the Morden Research Station, Man., 1961; recommended for favorable zones in all provinces.

*Miami* (Anisim seedling) Fruit ripe in mid September, 5–6.5 cm, creamy green well-washed with red, good for eating, fair for cooking. Cultivar developed at the Morden Experimental Station, Man., 1959; recommended for favorable zones in all provinces.

*Norland* (Rescue × Melba) Fruit ripe in mid August, 6–7 cm, greenish yellow striped with heavy dark overlay, good for eating and cooking, good for storing only if picked early. It is also moderately susceptible to fire blight. Originated at the Morden Research Station, Man., selected at the Experimental Farm, Scott, Sask., and introduced by the Prairie Co-operative Fruit Breeding Project, Morden, Man., 1979; hardy, recommended for all provinces.

*Parkland* (Rescue × Melba) Fruit ripe in mid August, 6–7 cm, greenish yellow with light red overlay, good for eating and cooking, good for storing. Originated at the Morden Research Station, Man., selected at the Lacombe Research Station, Alta., and introduced by the Prairie Co-operative Fruit Breeding Project, Morden, Man., 1979; hardy, recommended for all provinces.

*Patterson* (Columbia × Melba) Fruit ripe in late August, about 6 cm, blushed red over greenish yellow, excellent for eating, good for storing. Cultivar developed at the University of Saskatchewan, Saskatoon, Sask., 1960; recommended for Saskatchewan.

*September Ruby* (Rescue × Haralson) Fruit ripe in early to mid September, 6–7 cm diameter, bright red with light green background, good for fresh eating and storing, acceptable for juicing; originated at the Morden Research Station, Man., selected at the Beaverlodge Research Station, Alta., and introduced by the Prairie Co-operative Fruit Breeding Project, Morden, Man., 1986; hardy to zone 2a.

*Westland* (Heyer 12 × Dr. Bill) Fruit ripe in late August, 7–8 cm, greenish yellow with medium red overlay, fair for eating, good for cooking, fair for storing. Originated at the Morden Research Station, selected at the Horticultural Research Centre, Brooks, Alta., and introduced by the Prairie Co-operative Fruit Breeding Project, Morden, Man., 1979; hardy, recommended for all provinces.

### Plums, cherry plum hybrids, and sand cherries

The plums that can be grown on the prairies originated in several ways. Some were selected from native wild plums. Other hardy cultivars were selected from the Japanese plum introduced from Manchuria. Several are hybrids that have the good quality of the Japanese plum and the hardiness of the native Canadian or American plum (Fig. 4).

Hybrids between these plums and the low-growing sand cherry have larger, sweeter, and better-flavored fruit than the true sand cherry but are not as hardy. They are called cherry plum hybrids.

When selecting plum cultivars, consider all the factors in relation to your area. Several cultivars lack somewhat in hardiness but yield well in most years.

#### *Plums and plum hybrids*

*Bounty* (Assiniboine seedling) Fruit ripe in late August, about 3.5 cm, dark red; flesh orange yellow, good for canning. Cultivar developed by the Morden Experimental Station, Man., 1939; very hardy.

*Elite* (parentage unknown) Fruit ripe in late August, about 4 cm, dark red. Cultivar introduced by the University of Saskatchewan, Saskatoon, Sask., 1960.

*Grenville* (Burbank × *Prunus nigra*) Fruit ripe in late August, about 5 cm, dark scarlet; flesh golden, good for eating. Cultivar developed at the Central Experimental Farm, Ottawa, Ont., 1932; suitable only for milder regions.

*Norther* (Assiniboine seedling) Fruit ripe in early August, about 3.5 cm, bright red; flesh yellow, fair for eating. Cultivar developed at the Morden Experimental Station, Man., 1943.

*Patterson's Pride* (parentage unknown) Fruit ripe in late August, about 4.5 cm, dark red. Cultivar introduced by the University of Saskatchewan, Saskatoon, Sask., 1960.

**Fig. 4 Hardy plums yield well; this example is Tecumseh.**

*Pembina* (P. *nigra* × Red June) Fruit ripe in late August, 4–5 cm, red with heavy bluish bloom; flesh bright yellow, excellent for eating, fair for canning. Cultivar developed at the Experimental Station, Brookings, S. Dak., 1917.

*Prairie* (parentage unknown) Fruit ripe in late August, about 4.5 cm, dark red; somewhat freestone. Cultivar introduced by the University of Saskatchewan, Saskatoon, Sask., 1960.

*Ptitsin 5, 9, and 10* (*P. salicina*, Manchurian origin) Fruit ripe in early August, about 2.5–3.5 cm, greenish yellow, good for jam. Cultivars introduced by the Morden Experimental Station, Man., 1939.

*Tecumseh* (Shiro × Surprise) Fruit ripe in mid August, about 3.5 cm, bright red with bluish bloom; flesh yellow, good for eating. Cultivar developed at the Experimental Station, Brookings, S. Dak., 1918.

*Cherry plum hybrids*

*Dura* (Sapa seedling) Fruit ripe in late August, lasting on the trees into October, about 3.5 cm, dull green blotched with purple; flesh red, excellent for canning. Cultivar developed at the Morden Experimental Station, Man., 1942.

*Manor* (Sapa seedling) Fruit ripe in early August, 2.5–3 cm, dark purple red; flesh dark red, excellent for canning. Developed at the Morden Experimental Station, Man., 1945.

*Opata* (Sand cherry × Gold plum) Fruit ripe in late August, 2.5–3 cm, greenish covered with reddish purple; flesh yellowish green, good for preserves. Cultivar developed at the Experimental Station, Brookings, S. Dak., 1908.

*Sapa* (Sultan seedling) Fruit ripe in late August, about 2.5 cm diameter, purple with bluish bloom; flesh dark purple, excellent for canning and for jam. Cultivar developed at the Experimental Station, Brookings, S. Dak., 1908.

*Sapalta* (*Prunus besseyi* × *P. salicina*) Fruit ripe in late August, about 3.0 cm in diameter, reddish purple; flesh dark purple, slightly clingstone, excellent for jam or canning. Introduced by the Alberta Horticulture Research Centre, Brooks, Alta., 1941.

*Sand cherries*

Fruit ripe in mid August, about 2 cm, dark purple; flesh yellowish green to green, good for jam, jellies, or syrup. Many nurseries offer sand cherries for sale from seed sources that have generally proven successful in their areas. However, few cultivars have been released.

**Bush cherries**

Sweet cherries are not hardy enough for the prairies. Some of the Morello-type sour cherries are grown for trial in protected locations. The Mongolian or dwarf bush cherry and the Manuchu or Nanking cherry are both reasonably hardy and productive (Fig. 5). The fruits are small and rather acid but are suitable for pies and jelly.

*Mongolian cherry* (selected seedlings of *Prunus fruticosa*) Fruit ripe in late July, up to 1.2 cm, light to dark red; excellent for jelly. Bush produces many suckers and an abundant crop.

*Nanking cherry* (*P. tomentosa*) Fruit ripe in late July to mid August, about 1.2 cm, skin color is usually red but some white types are known; flesh creamy to pink, good for jelly. Shrub size about 2 m.

**Apricots**

Only hardy forms of Siberian and Manchurian apricots and hybrids from these are successful. Even in these types, the flower buds are often damaged by intense cold or are induced to develop prematurely during warm periods in early spring only to be killed by late frost. Good crops of apricots (Fig. 6) have been grown at Morden (Man.), Brooks (Alta.), and Saskatoon (Sask).

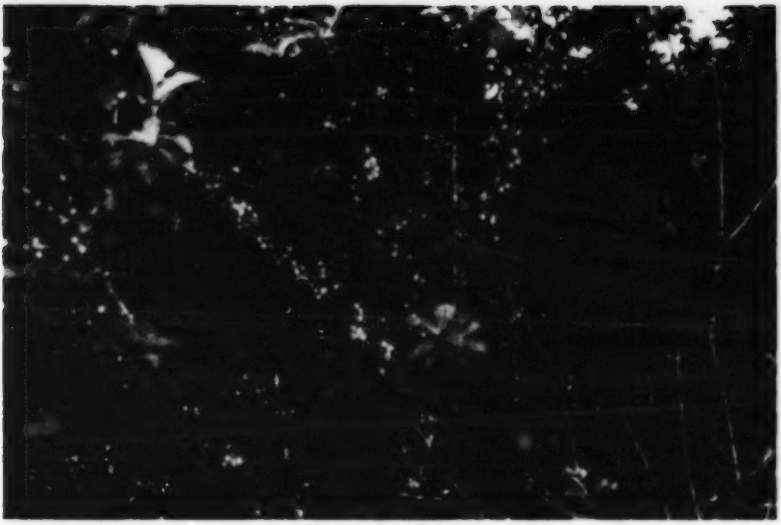


**Fig. 5 Nanking cherry (*Prunus tomentosa*).**

**Fig. 6 A branch of Westcot apricot with a crop of fruit.**

*Brookcot* (Manchurian apricot seedling) Fruit ripe in early August, 3–4 cm, bright yellow-orange with red cheek. Introduced by the Alberta Horticulture Research Centre, Brooks, Alta., 1980.

*M 604* (Scout × McClure) Fruit ripe in early August, 4–5 cm, golden yellow, becoming darker and reddish, good for eating and cooking. Cultivar developed at the Morden Experimental Station, Man., 1946.

*Scout* (Manchurian apricot seedling) Fruit ripe in early August, about 4 cm, bronze gold blushed with red, fair for eating, good for canning and jam. Cultivar developed at the Morden Experimental Station, Man., 1937.

*Westcot* (Scount × McClure) Fruit ripe in early August, 3.5–4.5 cm diameter, yellow-orange with light reddish blush, excellent for eating fresh or canning. Introduced by the Morden Research Station, Man., 1982.

### Pears

Strains of Manchurian and Siberian pears are hardy enough for the prairies, but most have fruits that are small, gritty, and useful only for canning. Some have fruits that are palatable when fully ripe. The new cultivars that have been developed by hybridization with *Pyrus communis* have better quality; however, fairly protected locations are needed for reliable fruit production.

*Golden Spice* (parentage unknown) Fruit ripe in mid to late September, about 5 cm, medium yellow, lightly blushed with dull red, fair for eating, good for canning and for spicing. Cultivar developed at the Fruit Breeding Station, University of Minnesota, Minneapolis, Minn., 1949.

*John* (Aspa × Siberian pear) Fruit ripe in late September, about 7.5 cm, greenish yellow, fair in quality. Cultivar developed at the University of Saskatchewan, Saskatoon, Sask., 1960.

*Pioneer 3* (Jargonelle seedling) Fruit ripe in late September, about 4 cm, greenish yellow, blushed with dull red, good for canning. Cultivar developed by A.L. Young, Brooks, Alta., 1936.

*Tait Dropmore* (Patten pear seedling) Fruit ripe in mid September, about 4 cm, greenish yellow, blushed with dull crimson, good for sauce. Cultivar developed at Skinner's Nursery, Dropmore, Man.

*Ure* (Tait Dropmore × (Beierschmitt × Bartlett)) Fruit ripe in mid September, about 5 cm, greenish yellow, good for eating and canning. Cultivar developed at the Morden Research Station, Man., 1978.

### Saskatoons

Saskatoons are a native crop throughout the prairies and plentiful supplies were once harvested from native stands. Interest in cultivated plantings has been stimulated by the loss of native habitats and by the

increasingly common crop failure of native plants. The Research Station at Beaverlodge, Alta., has been instrumental in publicizing the value of saskatoons and in improving the quality of cultivars. Generally, hardiness is not a limiting factor in saskatoon production; cultivars developed in Saskatchewan and Alberta should do well in all areas of the prairies. In addition to the four cultivars described, Parkhill and Success have been grown but met with limited commercial success.

*Honeywood* (*Amelanchier alnifolia* seedling) Bush productive, large-fruited; fruit pleasant-tasting, borne in clusters of up to 15 berries. Cultivar developed from northern Saskatchewan seedlings by Honeywood Nursery, Parkside, Sask.; introduced by Lakeshore Tree Farms Ltd., Saskatoon, Sask., 1973.

*Pembina* (*A. alnifolia* seedling) Fruit quality superior in taste compared with native plants. Cultivar developed from northern Alberta seedlings by Beaverlodge Nursery, Beaverlodge, Alta., 1932.

*Smoky* (*A. alnifolia* seedling) Plant productive; fruit large, with a flavor nearly as good as Pembina. Cultivar developed from northern Alberta seedlings; introduced by the Research Station, Beaverlodge, Alta., 1956.

*Thiessen* (*A. alnifolia* seedling) Native selection from the North Saskatchewan River; good flavor, large fruit (up to 10 mm diameter). Introduced by Lakeshore Tree Farms Ltd., Saskatoon, Sask.

# Establishing the trees

## Choosing a site

In determining a suitable site for an orchard (Fig. 7), the following factors are the most important: soil, air drainage, slope of land, exposure, proximity to the house, availability of water, and provision for a windbreak.

Fruit trees can grow on many kinds of soil, but do best on fertile, well-drained soil. Avoid low spots and areas that are alkaline. Soil that has grown good crops of cereals or has been used as a garden is suitable. When in doubt, have a sample of the soil analyzed at a soil-testing laboratory.

Air needs to drain away from the orchard. Avoid planting fruit trees in a hollow because cold air drains into low areas and the trees and fruit there are more likely to be damaged by frosts. Thus, the sides of a valley are suitable, but the bottom is not.

Level land is better than rolling or sloping land because it is easier to cultivate and is less susceptible to water erosion. Rolling land and steep slopes are also hard to irrigate. The best sloping land faces either north, northeast, or east; such exposures incur less freezing and thawing in spring. The land also stays cool later in spring, which delays the onset of growth and thus minimizes damage to buds by spring frosts. Trees are sunscalded less on north and east slopes.

An orchard near the house is easy to look after and beautifies the landscape. Rabbits are easier to control when people can easily watch the orchard. A suitable place to locate the orchard is at the end of the garden. A dugout or a reliable well that can be used for irrigation also favors a site near the house, where the water supply is usually located.

In an urban garden the choice of sites is more limited, but fruit trees can be part of the ornamental planting. When planted near large trees, however, they may get too much shade and not enough moisture, which reduces vigor of the plant and subsequent fruit yields. Avoid windswept corners. Determine whether the topsoil in your garden consists only of a thin layer covering subsoil excavated from the basement. If so, work well-rotted manure into the soil and follow other similar practices to improve tilth. Take special care while planting to place the roots in good topsoil. Do not expect trees to thrive when the soil in which you place them has a high lime content. Lime-induced iron chlorosis may limit plant growth or fruit yields, or both (see "Chlorosis").

## Shelter

In attempting to grow fruit trees, providing shelter is essential. On a farm, plant a windbreak or shelterbelt unless there is a natural shelter of bushes and trees. Besides protecting against desiccation by hot, drying winds in summer and cold winds in winter, the shelterbelts trap snow and provide breeding places for pollinating insects. By reducing the force of the wind, shelterbelts also prevent damage to trees and loss of fruit at harvest. In urban areas board fences, hedges, or temporary snow fences can be used. Buildings provide shelter, but don't plant your trees too close to them.

For best results, plant a row of fast-growing deciduous trees and a row of spruce or pine. The deciduous trees provide temporary shelter in a few years and the evergreens give greater protection for many years. Plant more than one row of evergreens when you have the space. Space spruce 3 m apart in the row and allow 4 m between rows. Conifers may be difficult to establish in the dry areas of the prairies, but they provide valuable shelter. The best deciduous trees for temporary shelter are caragana, lilac, laurel willow or sharp leaf willow, and Siberian elm. Rows of corn or sunflowers left standing help to catch snow and protect young trees.

Snowdrifts in the lee of a shelter may be heavy enough to break branches or even the main trunks of the trees. To minimize this hazard, make a snow trap by leaving a wide space between your fruit trees and the windbreak, or plant an additional row of caragana 10 m inside your windbreak (Fig. 8). Rhubarb, asparagus, and other vegetables do exceedingly well in the snow-trap area.

## Buying nursery stock

Buy trees of recommended cultivars, preferably from a reputable, local nursery. It is wise to deal with local firms because they have available the cultivars hardy for your area on hardy rootstocks. Purchase thrifty 1- or 2-year old trees.

**Fig. 7** A well laid out orchard, 8 years old and starting to bear. It has a protective field shelter and the land between the trees is cultivated.

**Fig. 8** Dense rows of spruce and caragana make an effective shelter and snow trap to protect the orchard.

## Time to plant

Plant fruit trees in early spring while they are still dormant. There is less danger of trees drying out in the cool, moist soil. Evaporation is low, growth is slow, and conditions are ideal for establishing the young trees. Trees purchased in the fall can be heeled in over the winter to avoid delays in planting in the spring.

To heel in nursery stock, dig a trench about 40 cm deep, with one side sloping at 30 degrees. Place the trees in the trench with the trunks on the slope. Water well and fill in with at least 30 cm of soil. Work fine soil around the roots, tamp well, and place extra soil on the trunks for further protection. Protect the trees against mice and rabbits.

## Planting

Trees bought in the spring must be kept cool and moist until you plant them. Dig the planting hole 60–70 cm square and 45 cm deep or big enough to contain the roots when they are spread out (Fig. 9). Pile the fertile topsoil at the side of the hole and spread the subsoil over the field. Place the tree in the hole with the graft union at ground level. Have the strongest root pointing to the west as an anchor against prevailing winds. Fill the hole with fine topsoil and work it in around the roots. Tamp firmly around the tree and leave a shallow depression. Water well and fill the depression with loose soil to form a mulch against evaporation. When you have only a few trees, support them with stakes that can remain for the first few years. Use strips of burlap or rubber to tie the trees to the stakes. Do not use twine or wire because it cuts into the bark.

Prune back the newly planted trees by one-third, because the root system has been reduced in the nursery digging process and cannot support full growth. When the tree is a 1-year-old whip only slight pruning is necessary, but, when the tree is 2 or 3 years old, more care is needed because the final shape of the tree depends on this vital pruning. The section headed "Pruning and training" provides more advice on this subject.

Attach small identification tags made of wood, aluminum, or other permanent material to each tree. Wire wrapped around a branch may eventually cut into the bark, so it is advisable to change it every few years.

A commercial plastic tree guard around the stem of a newly planted tree helps to protect the trunk from rodents and from mechanical and winter damage.

## Spacing

The distance between trees depends mainly on the fertility of the soil and the availability of moisture. With wide spacing the trees grow larger and yield better than with narrow spacing. When planting trees in a garden, allow enough space for plenty of air and sunlight to reach them. In orchards, plant apples, crab apples, apple crabs, pears, and apricots at least 7.5 m apart; plum trees 6 m; and cherry plum hybrids and sour cherries

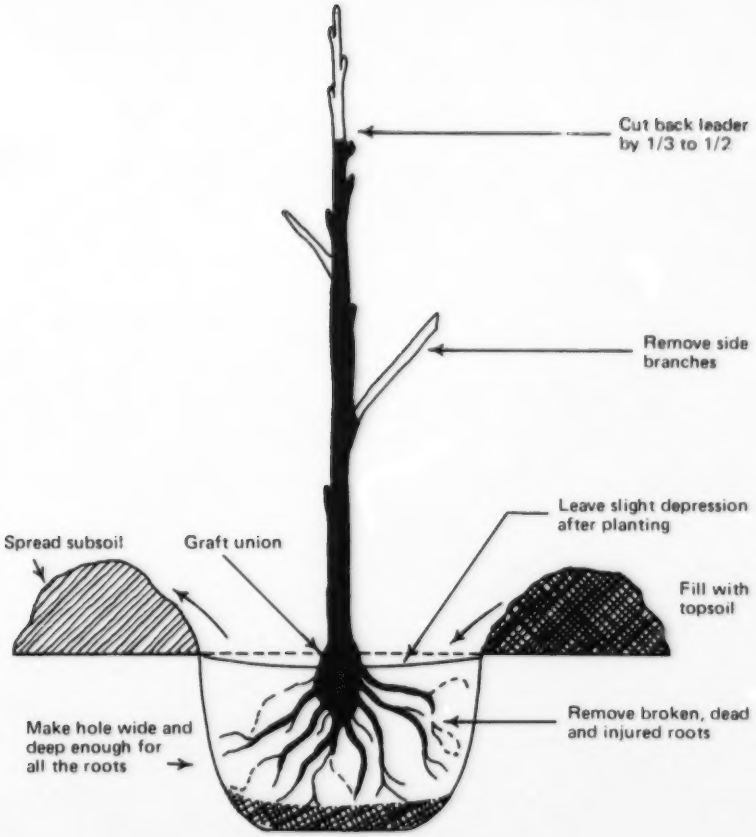

Cut back leader by 1/3 to 1/2
Remove side branches
Leave slight depression after planting
Spread subsoil
Graft union
Fill with topsoil
Remove broken, dead and injured roots
Make hole wide and deep enough for all the roots

**Fig. 9 How to plant a 1-year-old budded apple tree.**

4.5 m. Give individual saskatoon plants a spacing of 2.0 m between centres; with hedgerows allow 1.5–2.0 m within rows and 2.5–6 m between rows. To avoid competition from large trees and to reduce injury from snowbanks, plant fruit trees at least 12 m from the windbreak.

An easy method for laying out an orchard is to plant trees on the corners of squares or rectangles. Rows, both on the square and on the diagonal, formed in this way make the orchard easy to cultivate and spray.

To estimate the number of trees required per hectare, divide 10 000 by the product of the distance between rows times the distance between trees within a row. For example, for an orchard with trees planted 6 m apart in rows 7.5 m apart, you need 10 000/(7.5 × 6), or 222, trees per hectare.

## Planning and records

For an orchard, make a plot plan of the site and keep careful records of each tree, noting the row and tree numbers, which identify the plant. Record the names of the cultivars and the rootstocks, the ages of the trees, and the year of planting. Label the trees carefully.

For an urban garden, you do not need a ground plan for the few trees you plant, but do record the names of the cultivars and the rootstocks, the ages of the trees, and the year of planting. Label each tree.

## Replacing trees

Fruit trees, even with good management, grow old and unproductive. It is wise to plant some new trees every 5 years. This renewal keeps the orchard productive and provides trees of various ages so that some are likely to survive the severest winters. If you are growing crab apples successfully, introduce a tree or two of good-quality apples for trial.

# Management

## Pruning and training

On the prairies, prune and train to form low-growing trees with strong scaffold branches close to the ground. Prune carefully to help the trees develop strong frameworks, which can bear the load of fruit and resist damage from windstorms or heavy snow. Pruning is also necessary to remove diseased and dead wood, to get rid of sprouts and suckers, to prevent crowding in the centres of the trees, and to renew old trees.

Repair broken branches or cut out diseased wood at any time of the year, but do the annual pruning in early spring when the trees are dormant. You need a strong pruning knife, secateurs, a pair of loppers, and a pruning saw (Fig. 10). Keep the tools clean and sharp so cuts can be neat and cleanly made. Remove branches by cutting them off almost flush with the trunk. Leaving a long stub is detrimental to the healing process. Cutting too close to the main stem can also slow the process of callousing and subsequent healing.

### Apples and pears

After the tree has made 1 year of growth, training is important to shape and help develop the form of the plant. Of the many methods and ideas concerning training, the modified central-leader system of pruning is the most common on the prairies. Select two or three branches as permanent scaffolds, including, when possible, the bottom one on the southwest side to protect the trunk from sunscald. Choose wide-angled branches (Fig. 11) that are about 30 cm apart on the trunk; prune out the other branches.

The main pruning tools are 1) quality shears, 2) loppers for larger branches, 3) a saw for very large cuts (saws may be folding, straight, or with replaceable blades), 4) a large rasp, 5) a pole saw and pruner. Have shears and loppers sharpened every year, and never force them through too large a branch. You will also need 6) pruning compound and 7) pruning paint to protect fresh cuts. You may find a large rasp handy for evening up rough edges and smoothing off shoulders. You can rent or buy a pole saw and pruner for cutting high branches without climbing.

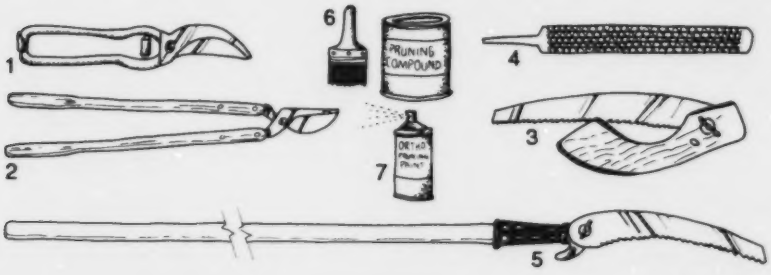



**Fig. 10 Pruning tools.**

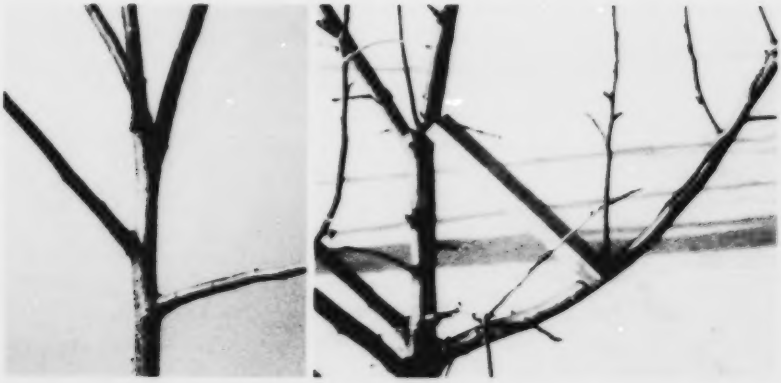


**Fig. 11 Crotch angles: *left*, narrow and weak, subject to breakage and crotch injury; *right*, wide and strong, showing how a block of wood can be used to train proper branch angle.**

Prune back the permanent branches by a half and head back the leader to balance the tree (Fig. 12).

When the tree is 3 years old, or 2 years after planting, choose one or two main scaffold branches. Aim for five to eight wide-angled main branches. Thin out side branches on the scaffolds and prune side and scaffold branches back to half the previous season's growth. Cut the leader back to promote a low-growing tree (Fig. 13). After this shaping, only corrective pruning, such as cutting out sprouts or damaged and ingrowing branches, is needed because heavier pruning delays fruiting.

### Plums and apricots

The modified central-leader system is the best one to use. Let the main leader grow freely for 2 or 3 years before pruning it. Then keep it headed back. Choose four to eight wide-angled scaffold branches and remove suckers or weak and broken side branches. Cut back long, vigorous branches. Aim for a symmetrical tree with stout branches.

Do not prune plum and apricot trees too severely at one time. Large wounds do not heal easily and the trees respond better to a light pruning from year to year.

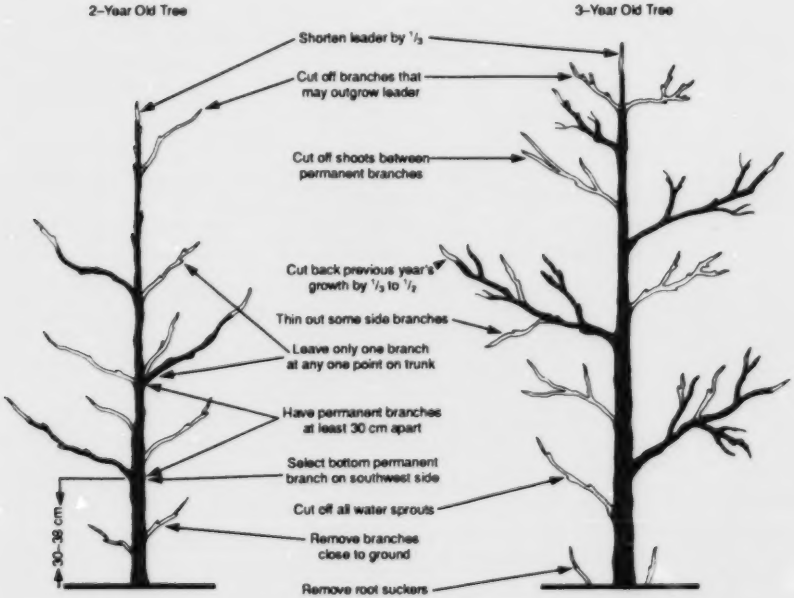

2-Year Old Tree
3-Year Old Tree
Shorten leader by 1/3
Cut off branches that may outgrow leader
Cut off shoots between permanent branches
Cut back previous year's growth by 1/3 to 1/2
Thin out some side branches
Leave only one branch at any one point on trunk
Have permanent branches at least 30 cm apart
Select bottom permanent branch on southwest side
Cut off all water sprouts
Remove branches close to ground
Remove root suckers
30-38 cm

**Fig. 12 How to prune young trees.**

**Fig. 13 Careful pruning results in well-shaped trees. *Left*, a 3-year-old seedling; *right*, the same tree 5 years later. Note the wide crotch angles.**

### Sand cherry and cherry plum hybrids

Because these plants do not form trees and are usually more shrubby in growth, they can be pruned heavily. Prune these plants more severely than the other types of fruit trees because they bear their best fruits on young wood. After they bear for 3–4 years, plants may be cut back close to the ground to promote the growth of new, strong stems. Heavy pruning keeps the bushes low, which assists in decreasing the danger of winter injury.

### Saskatoons

Young plants require little pruning other than to shape them into a desired form. Use extensive thinning to rejuvenate and promote new growth on older plants.

## Treating wounds

There is growing evidence that wound dressings are not very effective in promoting or speeding the healing of wounds. The overall vigor and health of the plant is more important. Trees that are under stress are more likely to have difficulty in healing wounds. Good, clean pruning cuts that do not leave a pronounced stub usually will heal rapidly.

## Propagation

Because flowers on fruit trees are cross-pollinated, seedlings grown from seed do not have the same characteristics as the parent. To propagate

a particular cultivar, vegetative propagation by budding or scion grafting is necessary. Scions or buds of several cultivars placed on one tree develop into branches that are true to type.

Budding is the most important propagation method among commercial producers of nursery stock. It is also used to topwork main stems or branches of young trees. Scion grafting is normally used in topworking older trees. It is a convenient method for rebuilding or rejuvenating an old tree, or for changing one to a better cultivar. Scions may also be bridge-grafted to repair damaged trees such as those girdled by mice or rabbits.

For a successful graft, the growing regions of the two parts must be brought together and held firmly in place until they unite and grow as one. The growing region, known as the cambium, is just under the bark. Make appropriate cuts through the bark to allow the cambium of the bud or scion to come into intimate contact with that of the rootstock or stem. The following procedures (Fig. 14) are the most common.

### Budding

Budding is the placing of a single dormant bud and its surrounding bark tissue on the cambium of a different stock. The shield or T-budding method is the most popular.

Budding is done in late July and early August with budwood cut from the current season's growth. At the base of each leaf on the terminal shoots is a dormant bud. To prepare for budding, trim off the leaves leaving about 1.0 cm of each petiole to use as a handle. Be sure to keep the bud sticks moist.

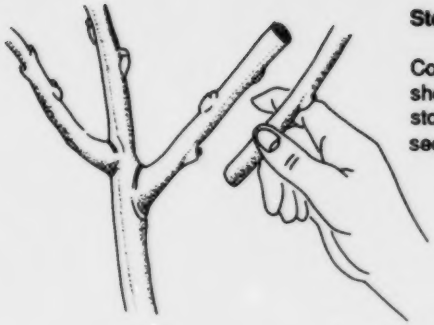
To start the budding operation, make a T-shaped cut at the selected place on the branch or rootstock so that the top of the T and the downstroke are about 2 cm long. Make both cuts through the bark to the wood but not into it. With a twist of the budding knife where the two cuts meet, lift the corners of the bark to form a V-shaped opening.

Cut a bud from the bud stick by taking about 3 cm of bark with the bud and as little wood as possible. Insert the bud in the T-shaped cut and push it into place. Cut off the bark on the bud above the T to allow the bud to fit closely to the stock. Then wrap the bud with rubber strips or raffia to hold it tightly against the stock until the union takes place. Rubber strips keep a constant pressure, expand with the stock as it grows, and eventually rot. Raffia must be removed after a month. Usually the bud has united with the stock by the end of 2 weeks. The petiole drops off and the bud remains dormant for the rest of the season. During the next spring it grows.

When you bud a seedling rootstock, cut off the stock 5 cm above the bud the following spring. When a bud has been used for topworking, remove the branch above the bud and other close buds that may weaken its growth.

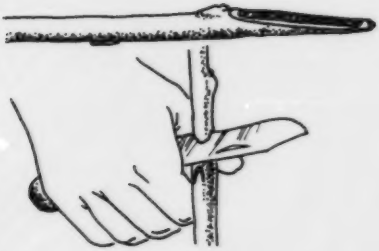
### Scion grafting

In scion grafting the cambium layers of the scion and the host must be brought together and held there until they unite. Scions, or pieces of last



**Step 1**

Compare scion and stock. Scion should be of same diameter as stock or somewhat smaller. Find a section of each between buds.



**Step 2**

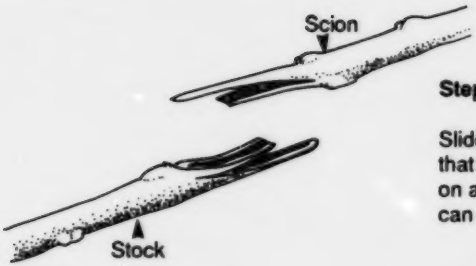
With a sharp knife, make a smooth, sloping cut on stock and scion from 3 to 6 mm long. A wavy cut will join poorly or fail to join.

**Step 3**

Make reverse cuts on both scion and stock, beginning about one-third of the way from tip. (Skip this step if cambium joins accurately.)

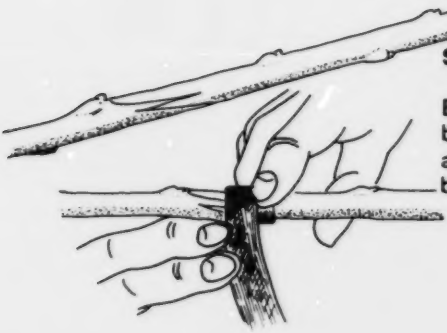
**Fig. 14A Budding and bridge grafting of new material (modified from *Propagation* by C. Brickell, 1979, Simon & Schuster).**

***(continued)***



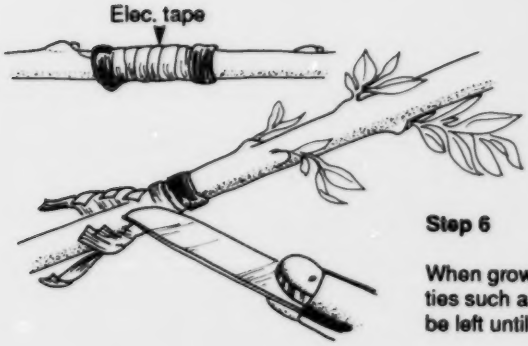

**Step 4**

Slide scion and stock together so that cambium is carefully matched on at least one side of stock. Stock can be slightly wider than scion.



**Step 5**

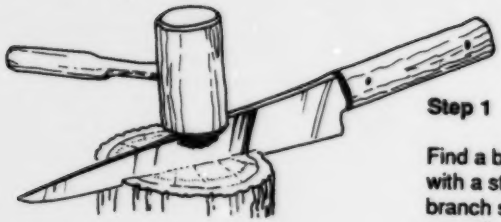
Bind with plastic stretch tape, budding rubbers, or raffia. Cover and wax entire length of cut. Snip all but three buds.




**Step 6**

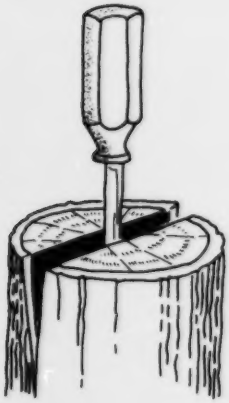
When growth begins, cut nonstretch ties such as raffia. Stretch tape may be left until following season.

**Fig. 14A (concluded).**



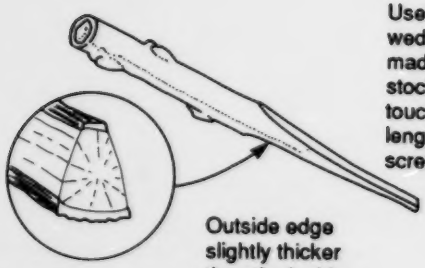
**Step 1**

Find a branch 3–10 mm in diameter with a straight, smooth portion. Saw branch straight across, leaving smooth area for splitting. Use a heavy knife, cleaver, or special tool for splitting. Place it across the centre of the cut and tap it with a mallet to split 5–8 mm down.



**Step 2**

Push a large screwdriver or chisel into the centre of the split to hold it open for the scions.

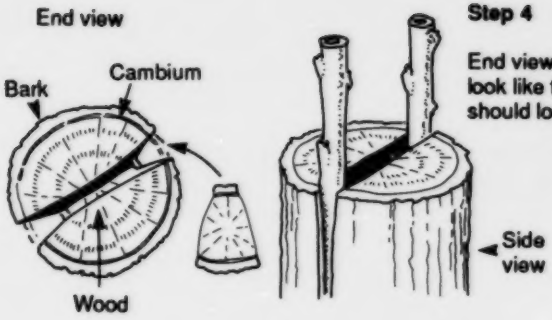



**Step 3**

Use two scions, each cut into a wedge shape with the angle of cut made to match the opening in the stock. Insert scions with cambium touching cambium of stock along length of wedge cut. Remove screwdriver to pinch scions in cleft.

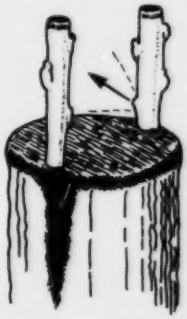
**Fig. 14B Scion grafting onto mature rootstock (modified from *Propagation* by C. Brickell, 1979, Simon & Schuster).**

***(continued)***



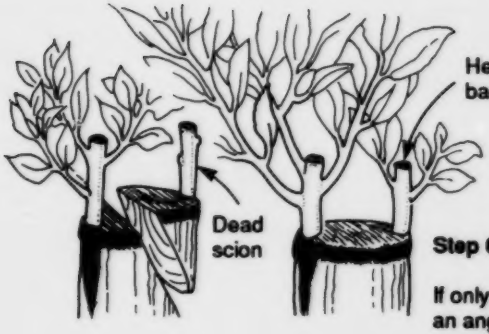

**Step 4**

End view of scion in stock should look like this. Side view of scion should look like this.



**Step 5**

Wax stock, filling cleft, and coat scions heavily along sides. Clip to three buds if necessary and wax end cut. Paint with white interior latex in sunny weather.




**Step 6**

If only one scion grows, cut stock at an angle and paint with pruning compound. If both grow, head back the weaker, but leave it to help heal stock.

**Fig. 14B (concluded).**

year's growth with 6 to 10 buds, are cut during the winter when the trees are dormant; they are stored in plastic bags with moist peat at 3–5°C. Grafting is usually done in the spring when growth starts and the sap is running.

A method commonly used is cleft grafting. Carefully select the branches to be topworked so that the grafts are well distributed throughout the tree; cut the branches off square. Make a cleft in the stub end of each branch and insert the scion so that the cambium layers meet. Remember to taper the end of the scion and provide as much surface as possible for union of the growing parts. Coat the graft with wax.

Bridge grafting is a special technique for repair grafting. It is used to repair trees girdled by mice or rabbits or damaged during careless cultivation. Scions are placed in the bark to bridge the gap and provide a conduit that allows the sap to flow. Restoring a tree satisfactorily requires skilled grafting so you may wish to seek advice before attempting it.

*Grafting waxes*

Many kinds of grafting wax are available for commercial use. If you cannot buy one in your area, mix ordinary paraffin wax (used for sealing jams and jellies) 2:1 with beeswax. Warm the wax sufficiently to melt it, but ensure that it is not too hot when applied because it may damage sensitive tissues.

## Stembuilders

The trunk and main branches of a fruit tree are the parts most susceptible to frost damage. Studies at the Research Station at Morden have shown that most injury to the trunk and main branches can be avoided by a method of training and budding known as stembuilding. This method involves budding a desirable apple on the frame of a very hardy crab apple. Select wide-angled branches on the stembuilder that are about 30 cm apart and spaced uniformly around the main trunk. Remove narrow-angled branches because they are subject to winter injury and breakage under heavy loads of fruit. All branches that reach 1 cm in diameter can be budded in August. General instructions for budding are given in the section entitled "Propagation." In this particular technique, however, the bud is placed on the top side of the branch about 15–20 cm from the main trunk. Try to choose the first bottom branch at least 35–45 cm above ground level and on the southwest side of the trunk to prevent sunscald. Five to seven wide-angled, topworked branches, including the leader, are needed to finish the complete budding in 3 years (Fig. 15). Only normal pruning and the removal of suckers is then necessary. A mature stembuilder trunk of the crab apple cultivar Nertchinsk is shown in Fig. 16.

From the results obtained at Morden, three cultivars are recommended as hardy stembuilders.

*Anaros* (Antonovka seedling) No injury occurred on the frame or on topworked apple branches after the 1966 and 1967 test winters; trees on

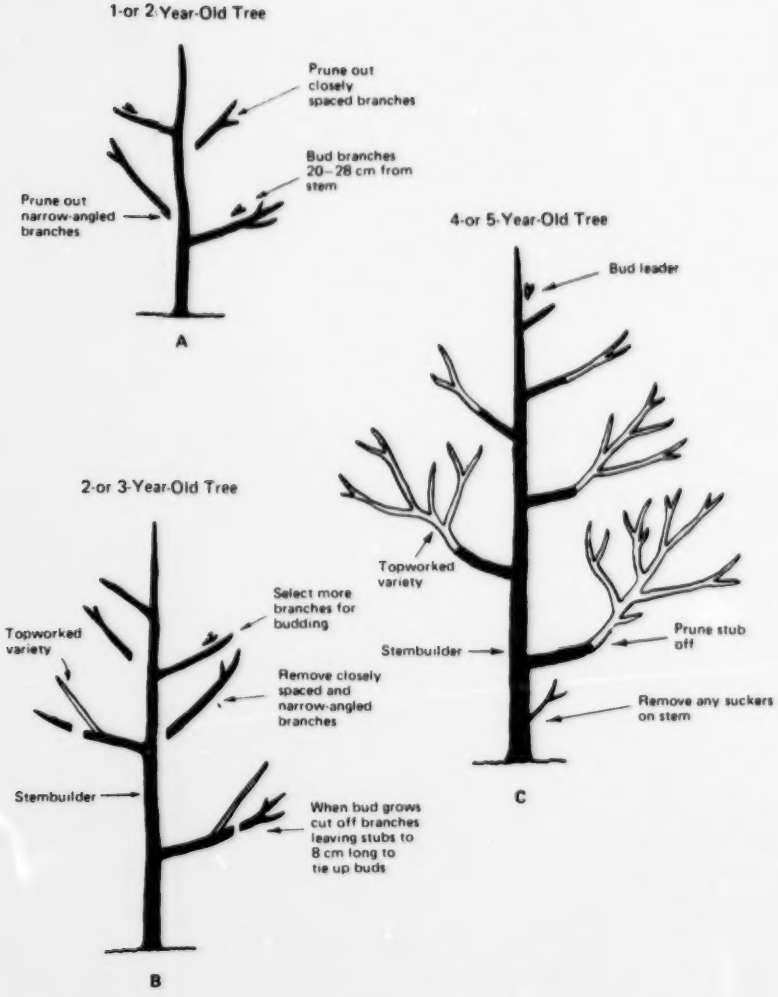



**Fig. 15 Using a stembuilder to develop hardy trees of good-quality apples.**

this framework have produced the highest yield of fruit to date. This cultivar has been used in Ontario and Quebec. Limb breakage under the heavy loads of fruit can be reduced by choosing wide-angled branches for topworking. This stembuilder is a vigorous stock.

**Fig. 16 Stembuilder trunk of *Malus baccata* 'Nertschinsk' with proper placement of branches.**

*Kerr* (Dolgo × Haralson) This apple crab produces wide-angled branches and is a promising choice as a hardy semivigorous stembuilder for topworking.

*Nertchinsk* (*Malus baccata*) This dwarf selection of Siberian crab apple was collected in Manchuria. Used as a stembuilder, it dwarfs the topworked plant and produces low-headed trees that are less likely to suffer winter injury. They are easier to spray and pick than the standard-sized trees. The trees are hardy and productive. This stembuilder has proven compatible with all apples topworked.

## Cultivation

Cultivating regularly is desirable in prairie orchards because moisture is usually low. Cultivation conserves moisture by killing weeds. It also

maintains good aeration and stimulates the activity of the soil organisms. It destroys some insect pests by exposing the pupae.

In wet years, it is best to stop cultivation by the end of July to allow growth to slow down and the trees to harden for winter. Because rainfall is generally low in August, however, it may be practical to cultivate lightly until September to conserve moisture.

Shallow cultivation is important. Cultivate only 5–8 cm deep so as not to injure the roots near the surface. Use machinery with care to prevent damage to the trees. A hoe or spade is useful in an urban garden, but be sure to only cultivate shallow.

## Irrigation

Water trees during the growing period when the weather is dry. Growth begins in May and peaks in July when the fruit is developing. It is particularly important to keep the trees growing vigorously when the fruit is filling and the buds for the next year's crop are being formed.

Water sparingly from August to October to allow the trees to harden for the winter. A good watering after the leaves drop is sometimes necessary to prevent the trees from drying out in the winter. Because trees are not surface feeders, soak the ground under them thoroughly with each watering. Water newly planted trees often until they are established.

## Cover crops, mulches, and fertilizers

In farm orchards, use cover crops and green manures to keep the soil fertile by adding organic matter to it. Although a cover crop is helpful, most prairie orchards are cultivated regularly because soil moisture is usually low. Well-rotted manure is a good source of organic matter.

A cover crop of fall rye, oats, barley, or peas planted in late July serves three purposes. First, it absorbs nutrients and moisture, slowing down growth of trees and helping them to harden in the fall; second, it provides some protection for roots in the winter; and third, it catches snow and holds it until spring. One serious disadvantage of a cover crop or a straw mulch is the increased danger of damage by mice.

Grass has been successfully used as a ground cover in established orchards at the Morden Research Station. With grass culture, herbicides are effective for vegetation control around the bases of the trees. Grass must be mowed short to remove cover for rodents.

Most garden soils are fertile and have a balanced supply of nutrients but it is possible that the soil is low in some plant nutrient. In poor soils the trees grow poorly, the leaves are lighter green and unhealthy looking, and the fruits are small. Trees that have been bearing heavily for several years may require some feeding. Well-rotted manure provides much of the necessary nutrients.

If you use fertilizers for your garden or lawn, put some under your trees as well. Spread the fertilizer on the ground under the tips of the branches, away from the trunks. Broadcast 500 $cm^3$ of 16-20-0 or 14-14-7 for every

9 $m^2$ and work it lightly into the soil; the trees should soon regain their normal color. Do not fertilize in late summer or early fall because the trees need to harden before winter.

When a soil test shows that some major element is lacking or that the soil is either strongly acid or alkaline, apply the appropriate amendment so that the trees can grow satisfactorily. It may be necessary to obtain the advice of specialists in some situations.

## Thinning the crop

Under most conditions harvested fruits are larger and have better color when some young fruit are removed early from the trees. Leave the rest of the fruit distributed evenly over the tree to prevent heavy loads from splitting or breaking the limbs. Thinning also reduces the strain on the tree caused by producing a crop every year. Overbearing may weaken the tree and leave it susceptible to winter injury.

Delay thinning of apples until after the natural fall in early June when they are about 2.5 cm in diameter. Blossom-thinning chemicals are not recommended for the prairies. Late spring frosts may kill the flowers at any time; the application of a chemical coupled with a late frost would result in a small crop.

## Harvesting and storage

Because fruits are perishable, pick and handle them carefully. Pick at the proper stage of ripeness to obtain the best quality. Allow all fruits, except pears, to ripen on the trees.

Pick pears when the flesh is firm and store them at room temperature until fully ripe and soft. Plums are ready to pick when they have a waxy bloom and the flesh feels slightly soft when pressed. Overripe plums are soft and juicy. For canning, plums may be picked when they are slightly immature.

There are several ways to tell when an apple is ripe. Check often during the period when the fruit is known to mature in your area. Color changes indicate maturity in most cultivars, and the darkening of the seeds is also an indication. When some fruits have dropped, others are probably maturing. Perhaps the best advice is to choose one or two apples, slice them to see whether all greenness is gone from the centre, and taste them for sweetness. Generally, pick apples for storage a week before they are fully ripe. Crab apples hang on the trees until well past ripeness. Sample them regularly to determine the best time for picking.

For ideal winter storage of apples, the temperature should be 2–4°C. If you do not have a room at this temperature, use the coolest one available. Although air is difficult to keep moist in the dry atmosphere of the prairies, try to increase the humidity in the storage room by placing pans or pails of water there or by sprinkling water on the floor. Providing ventilation is also important because apples give off some odors and absorb others from products stored with them.

Apples are the only fruits that can be stored satisfactorily without special facilities. Preserve other fruits by freezing or canning.

## Controlling pests and diseases

Various pests, such as insects, mites, mice, and rabbits, and diseases may periodically affect tree fruits on the prairies. Fortunately, the harsh climate prevents some of the major orchard pests from becoming established. Good cultural practices and protection afforded by natural predators help to prevent outbreaks of disease and invasion by pests. Strong, healthy trees can withstand the onslaught of pests better than weak ones. Keep your orchard clean by disposing of fallen fruit and leaves and by burning pruned branches, especially diseased ones. Encourage birds in or near the orchard because they help to control insect pests, mice, and rabbits.

### Pests

When you do use a pesticide, follow closely all the directions and cautions on the label, especially those on rates of application and on keeping the poison away from children. For some treatments, an interval is required between date of last application and harvest. The interval varies with the material used, the number of applications, and the amount applied. Maintain the recommended interval to avoid residues that would render the fruit unfit for use. For all spraying, follow the recommendations of your provincial insect and disease control bulletins.

Many kinds of sprayers are available. For treating a few trees, a small knapsack sprayer is adequate. When water under pressure is available, a sprayer that attached to the end of the garden hose is satisfactory. For treating many trees, a large, tractor-drawn power sprayer is required.

#### Insects

For insects that eat foliage, such as cankerworms, tent caterpillars, tussock moths, webworms, and the pear sawfly, spray the trees thoroughly with a recommended chemical as soon as you see the insects or notice a loss of leaves. Sprays can also control the plum curculio, if applied when the fruits begin to form.

For insects that suck, such as aphids, plant bugs, and leafhoppers, spray as soon as you see the insects. For aphids that live inside curled-up leaves, such as the mealy plum aphid, anticipate their attack and spray as soon as the young leaves appear in the spring.

Scale insects are protected by their waxy cover for most of the year. They overwinter as eggs under the scales on the bark and hatch in the spring. About June 15, or when the lilacs begin to bloom, spray with a recommended chemical.

### Mites

Mites belong to the spider family and are usually visible only through a magnifiying glass. One group of these pests feeds on the undersides of leaves and is usually protected by fine silken webs. The leaves turn grayish and drop early. Another group forms long, cylindrical galls on the upper surface of the leaves, particularly those of plum. To control either group, spray as soon as the new leaves appear in the spring.

### Mice and rabbits

Mice and rabbits cause heavy losses in prairie orchards. Mice chew the bark at or near ground level and often girdle a tree and kill it. Rabbits trim off small branches and eat the bark from large branches and trunks. Bridge grafting as outlined earlier may be necessary to repair damage.

*Mice* Several new repellents on the market protect the trees. It is best to paint them on with a brush. Regular cultivation and removal of nesting places, such as rubbish piles and long grass, help to keep mice away.

Poisoned baits are effective, but use them with caution. To make the baits, place poisoned oats, chop, or carrot cubes in tin cans with tops bent in just far enough to let a mouse enter. Lay the cans on their sides at suitable locations throughout the orchard and cover them with boards or a little straw.

When you have only a few trees, protect them by encircling the bottom parts of the trunks with aluminum foil, cylinders of wire netting such as window screening, or commercial tree guards.

*Rabbits* Fencing with 4 cm poultry wire 1.2 m high keeps out rabbits. Snow fence or wire mesh placed around individual trees (Fig. 17) helps when you have only a few. Persistent shooting and trapping also helps.

Repellents that protect trees against mice are also effective against rabbits.

## Diseases

On the prairies, fire blight (Fig. 18) is the most serious disease of apples and pears. Antibiotics have been reported to give partial control of the bacteria that cause fire blight. Removal of diseased branches, twigs, and overwintering cankers, and control of aphids and leafhoppers that may spread the disease, are recommended. When pruning diseased branches, make the cut at least 15 cm below the last point of infection. Carefully disinfect the tools after each cut and, if possible, burn diseased wood and leaves immediately, or dispose of them with your regular garbage pickup.

Leaf spots, apple scab, cedar-apple rust, and many other fungal diseases may become problems that require chemical control.

Powdery mildew, which occasionally attacks the leaves of the fruit trees, particularly cherry plum hybrids, may be controlled by spraying at the first sign of infection. Repeat if necessary.

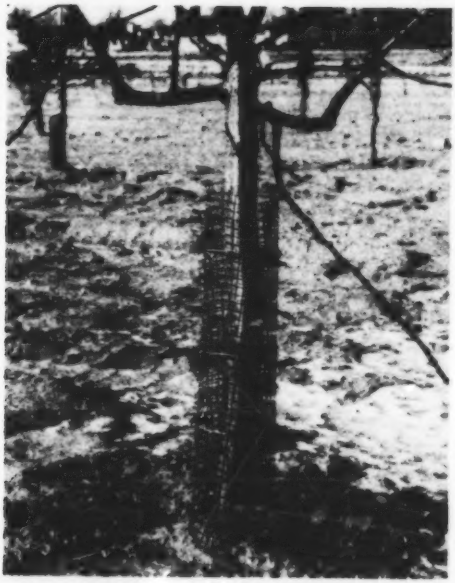


**Fig. 17 Fine-mesh screen protects the trunk of a tree against rabbits.**

**Fig. 18 Early signs of the disease fire blight show up as leaves on the tips of the tree turn brown, wither, and die.**

Plum pocket is a disease in which the plums become greatly enlarged and form irregular, hollow, conspicuous pouches. Destroy the diseased fruit and spray the dormant trees in early spring.

Black knot is distinguished by conspicuous, black, elongated galls on twigs and branches of plums. This fungal disease also occurs on native plum and chokecherry. Remove galls from the plum trees and from native plums and chokecherries growing near your orchard.

## Chlorosis

Lack of iron is a common nutritional problem on prairie soils. It causes leaves of fruit trees to turn yellow or whitish (Fig. 19), a condition termed chlorotic. The first sign of chlorosis may appear either in the leaves on one branch, or on new, succulent growth at the tips of branches. When the deficiency is not corrected, the trees may eventually die or be too weak to withstand the cold weather. In alkaline soils, i.e., those containing high amounts of lime, although there is usually plenty of iron in the soils, the iron exists in a chemical form that is unavailable to plants. Trees need very little soluble iron, but this small amount is essential for the development of chlorophyll.

**Fig. 19 Lime-induced chlorosis on new growth of an apple tree.**

◀ **Fig. 20 Sunscald on the base of the trunk of an apple tree.**

**Fig. 21 A young tree wrapped with a commercial tree guard to protect it from sunscald and rodents.**

**Fig. 22 Latex paint protects tree trunks from sunscald.**

In home gardens or where only a few trees are chlorotic, add materials to acidify the soil such as acidic peat or sulfur. Ferrous sulfate at 500 g for each 5 cm of trunk diameter helps to correct most conditions. Dig small holes in the soil under the tips of the branches and fill them with the chemical, or spread it on the ground and water it into the soil. Commercial preparations called iron-chelated compounds are also available, which give rapid, short-term aid.

**Sunscald**

Blistering and sunscalding of the bark (Fig. 20) on the southwest side of fruit trees is common in prairie plantings. In early spring the heat and light from bright sunshine, especially reflecting from the snow, stimulates some sap to move. Frost may then damage the tissues when the temperatures drop. Any injury to the bark provides access for disease organisms that can kill a tree. Covering the trunk and main branches with boards, building paper, aluminum foil, tree wraps, commercial tree guards (Fig. 21), or even a heavy coat of white latex paint (Fig. 22) reduces the damage.

## More information

The provincial departments of agriculture publish lists of recommended cultivars. These lists are updated from time to time as new information is gathered or new cultivars are released.